

# Research Bulletin

## NWT Cumulative Impact Monitoring Program

### Does frequency of flooding affect wetlands in the Slave River Delta?

#### Summary

Hearing local community concerns, University of Saskatchewan researchers wanted to understand how the nutrient and potential contaminant (mercury and other trace metals) levels of wetlands in the Slave River Delta are influenced by how often they are flooded by the River. To do this, we worked collaboratively with the Deninu Kujé First Nation, Fort Resolution Métis Government, and the Government of the Northwest Territories. We found that the frequency of flooding does influence the water and sediment chemistry of the wetlands. But less frequent flooding does not mean that levels of mercury or other metals will increase in food webs.

#### Why is This Important?

There are ongoing concerns within communities along the Slave River about the health of the river and delta, particularly the impact of less frequent flooding on surrounding wetlands. To date, little is known about the levels of nutrients, mercury, or other metals in the water, sediment, plants, and animals in these wetlands.



Raymond Sayine collecting samples in 2021 (Credit: L. Doig)

#### What Did We Do?

We sampled eight waterbodies across the Slave River Delta. Each waterbody varied in how closely linked it was to the Slave River. Some locations were well-connected to the river and frequently flooded, while other locations were less connected, mainly being filled by snowmelt and rain.

Water, sediment, algae, aquatic plants, and invertebrates (bugs) were collected from each waterbody. Water samples were assessed for general water quality and nutrients levels. All samples were assessed for trace metals, with a particular focus on mercury.



## What Did We Find?

We found that mercury concentrations were lower in invertebrates in wetlands that aren't frequently flooded by the Slave River.

In comparison to the Slave River, sampling of wetlands showed variation related to the frequency of flooding including:

- General water chemistry and nutrient availability
- Concentrations of mercury and trace metals in water and sediment
- Concentrations of mercury and other trace metals in invertebrates

## What Does This Mean?

These findings show that although less frequent flooding has many effects on the Slave River Delta region, less frequent flooding of wetlands does not appear to result in higher levels of mercury and other trace metals in plants and animals.

We also found a predictable relationship between sediment type and trace metals, with sediments made up of finer material (clay) linked to higher concentrations of trace metals, including mercury. This relationship could provide a basis for developing site-specific sediment quality objectives and to compare to future surveys.

## What are invertebrates?

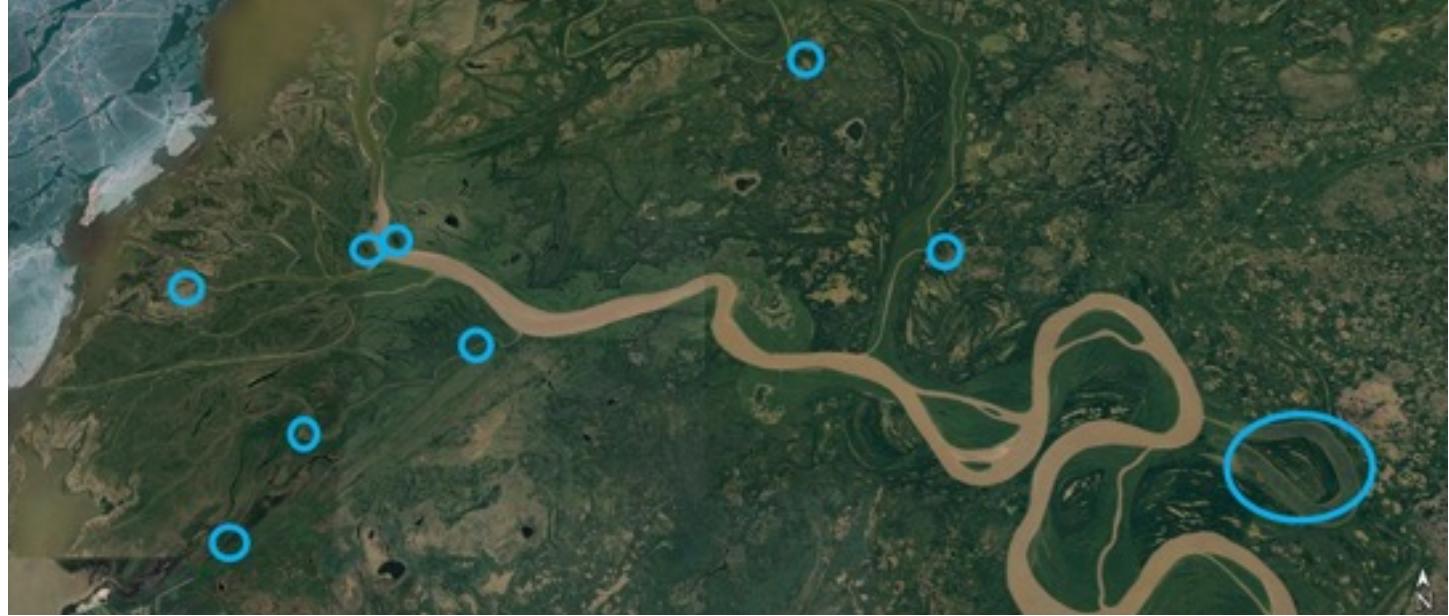
Invertebrates are any animals that don't have a backbone. The types of invertebrates collected for this project included snails, dragonfly nymphs/larva, and zooplankton (microscopic animals that live in lakes and ponds).

## For More Information

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NWT Cumulative Impact Monitoring Program (CIMP209)

Doig L.E., Carr M.K., Meissner A.G.N., Jardine T.D., Jones P.D., Bharadwaj L., Lindenschmidt K-E. 2017. Open-water and under-ice seasonal variations in trace element content and physicochemical associations in fluvial bed sediment. *Environmental Toxicology and Chemistry* 36: 2916–2924.



Map of Slave River Delta showing sampling locations. (Credit: L. Doig)

**NWT CIMP** is a source of environmental monitoring and research. The program coordinates, conducts and funds the collection, analysis and reporting of information related to NWT environmental conditions. If you're conducting environmental monitoring and research, consider sharing your information with northern residents and decision-makers in a Bulletin.